

1           **DO-IT-YOURSELF ASSEMBLY CONSTRUCTION PIECES**

2       **BACKGROUND OF THE INVENTION**

3       **1. Field of the Invention**

4           The present invention relates to a do-it-yourself assembly  
5       construction piece, and more particularly to an assembly construction piece  
6       that can be selectively combined to build various objects.

7       **2. Description of Related Art**

8           Do-it-yourself (DIY) assemblies in accordance with the prior art  
9       usually have a specific configuration, and the pieces for a specific assembly  
10      cannot be used to build other objects. For example, a shelf assembly is  
11      composed of multiple long straight rods with multiple threaded holes and is  
12      assembled by screwing screws into the threaded holes to combine the rods  
13      together. Therefore, angles between two rods and configuration of the shelf  
14      assembly are constant and cannot be changed. When the shelf assembly is  
15      not used, the rods are virtually impossible to form other assemblies.

16           The present invention has arisen to mitigate or obviate the  
17      disadvantages of conventional DIY modules.

18       **SUMMARY OF THE INVENTION**

19           The main objective of the present invention is to provide do-it-  
20      yourself assembly construction pieces that can be selectively combined to  
21      form various objects.

22           Further benefits and advantages of the present invention will become  
23      apparent after a careful reading of the detailed description with appropriate  
24      reference to the accompanying drawings.

1      **BRIEF DESCRIPTION OF THE DRAWINGS**

2            Figs. 1A-1F are perspective views of a first group of do-it-yourself  
3       assembly construction pieces in accordance with the present invention,  
4       wherein the pieces are linear pieces;

5            Figs. 2A-2C are perspective views of a second group of do-it-  
6       yourself assembly construction pieces in accordance with the present  
7       invention, wherein the pieces are outside corner pieces;

8            Figs. 3A-3B are perspective views of a third group of do-it-yourself  
9       assembly construction pieces in accordance with the present invention,  
10      wherein the pieces are acute inside corner pieces;

11          Fig. 4 is a perspective view of a fourth embodiment of one do-it-  
12       yourself assembly construction piece in accordance with the present  
13       invention, wherein the piece is a complementary linear piece;

14          Figs. 5A-5B are perspective views of a fifth group of do-it-yourself  
15       assembly construction pieces in accordance with the present invention,  
16       wherein the pieces are right angle sleeves;

17          Fig. 6 is a perspective view of a sixth embodiment of one do-it-  
18       yourself assembly construction piece in accordance with the present  
19       invention, wherein the piece is a linear 90° degree connector;

20          Figs. 7A-7B are perspective views of a seventh group of do-it-  
21       yourself assembly construction pieces in accordance with the present  
22       invention, wherein the pieces are single plane multiple point connecting  
23       pieces;

24          Fig. 8 is a perspective view of an eighth embodiment of one do-it-

1 yourself assembly construction piece in accordance with the present  
2 invention, wherein the piece is an adjustable connector;

3 Fig. 9 is a perspective view of a ninth embodiment of one do-it-  
4 yourself assembly construction piece in accordance with the present  
5 invention, wherein the piece is a pivoting connector;

6 Figs. 10A-10B are perspective views of a tenth group of do-it-  
7 yourself assembly construction pieces in accordance with the present  
8 invention, wherein the pieces are orthogonal corner pieces;

9 Figs. 11A-11B are perspective views of an eleventh group of do-it-  
10 yourself assembly construction pieces in accordance with the present  
11 invention, wherein the pieces are acute three axis corner pieces;

12 Fig. 12 is a perspective view of a twelfth embodiment of one do-it-  
13 yourself assembly construction piece in accordance with the present  
14 invention, wherein the piece is an offset linear piece;

15 Fig. 13 is a perspective view of a thirteenth embodiment of one do-  
16 it-yourself assembly construction piece in accordance with the present  
17 invention, wherein the piece is a flat curved corner piece;

18 Fig. 14 is an operational perspective view of a first assembly  
19 composed of the do-it-yourself assembly construction pieces, wherein the  
20 assembly is a chair;

21 Fig. 15 is an operational perspective view of a second assembly  
22 composed of the do-it-yourself assembly construction pieces, wherein the  
23 assembly is a stool;

24 Fig. 16 is an operational perspective view of a third assembly

1 composed of the do-it-yourself assembly construction pieces, wherein the  
2 assembly is a shelf frame;

3 Fig. 17 is an operational perspective view of a fourth assembly  
4 composed of the do-it-yourself assembly construction pieces, wherein the  
5 assembly is a bike-rack; and

6 Fig. 18 is an exploded perspective view of a do-it-yourself assembly  
7 construction piece with an anti-rotation device in accordance with the present  
8 invention.

9 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

10 A Do-it-yourself assembly construction piece in accordance with the  
11 present invention comprises a body and at least one connecting portion on  
12 the body. The body and at least one connecting portion are made preferably  
13 of metal. The body has a thickness, multiple edges and multiple surfaces.  
14 The at least one connecting portion extends from the body at the edges of the  
15 body. Each connecting portion has a thickness, a through hole and a convex  
16 distal edge. The thickness of each connecting portion is half the thickness of  
17 the body. The body has a concave edge formed concentrically with the  
18 through hole in each connecting portion to mate with the concave distal edge  
19 on an adjacent assembly construction piece. When two connecting portions  
20 of two adjacent assembly construction pieces overlap, the through holes align,  
21 and the two adjacent assembly construction pieces are connected by fasteners  
22 mounted through the through holes.

23 Multiple groups and embodiments of the do-it-yourself assembly  
24 construction pieces are used to form various assemblies, some of which are

1 illustrated in the drawings.

2 With reference to Figs 1A to 1F, a first group of the do-it-yourself  
3 assembly construction pieces are linear pieces of various lengths. Each  
4 assembly construction piece has a straight body (10a-10f) and two  
5 connecting portions (12). Each straight body (10a-10f) has two ends (not  
6 numbered). The connecting portions (12) are formed respectively on the two  
7 ends of the straight body (10a-10f). Each connecting portion (12) has a  
8 through hole (122) and a convex distal edge (124). The through hole (122) is  
9 defined through the connecting portion (12). Each body (10a-10f) has a  
10 concave edge (14) formed to correspond to the concave distal edge (124) on  
11 an adjacent assembly construction piece.

12 With reference to Figs 2A to 2C, a second group of the do-it-yourself  
13 assembly construction pieces has multiple outside corner pieces with  
14 different lengths. Each outside corner piece has a bent longitudinal body  
15 (20a-20c) and two connecting portions (22). Each body (20a-20c) has two  
16 ends (not numbered), an inner side (not numbered), an outer side (not  
17 numbered) and two concave edges (24). The concave edges (24) are formed  
18 respectively on the two ends of the body (20a-20c). The connecting portions  
19 (22) are formed respectively at the two ends on the outer side. Each  
20 connecting portion (22) has a through hole (222) and a convex distal edge  
21 (224). The through hole (222) is formed through the connecting portion (22)  
22 concentric with the concave edges (24) of the body (20a-20c). The convex  
23 distal edge (224) is concentric with the through hole (222) and corresponds  
24 to the concave edge of an adjacent connecting portion. With reference to Fig.

1      2C, the bent longitudinal body (20c) is bent 90° and is a preferred corner  
2      piece.

3            With reference to Figs 3A to 3B, a third group of the do-it-yourself  
4      assembly construction pieces has multiple inside corner pieces. Each inside  
5      corner piece has a bent longitudinal body (30a, 30b) and two connecting  
6      portions (32). Each bent longitudinal body (30a, 30b) has two ends (not  
7      numbered), an inner side (not numbered), an outer side (not numbered) and  
8      two concave edges (34). The concave edges (34) are formed respectively on  
9      the two ends of the body (30a, 30b). The connecting portions (32) are formed  
10     respectively at the two ends on the inner side. Each connecting portion (32)  
11     has a through hole (322) and a convex distal edge (324). The through hole  
12     (322) is formed through the connecting portion (32) concentric with the  
13     concave edges (34) of the body (30a, 30b). The convex distal edge (324) is  
14     concentric with the through hole (322) and corresponds to the concave edge  
15     of an adjacent connecting portion. With reference to Fig. 3B, the bent  
16     longitudinal body (30b) is bent 90° and is a preferred corner piece.

17            With reference to Fig. 4, a fourth embodiment of the do-it-yourself  
18      assembly construction piece is a complementary linear piece and has a  
19      straight body (40) and two connecting portions (42). The straight body (40)  
20      has two ends and two sides, and the connecting portions (42) are formed  
21      respectively on opposite sides of the straight body (40) from each other.

22            With reference to Figs 5A and 5B, a fifth group of the do-it-yourself  
23      assembly construction pieces has multiple right angle sleeve pieces. Each  
24      right angle sleeve piece has a body (50a, 50b), one connecting portion (52)

1 and a hexahedron sleeve (56). The body (50a, 50b) has two ends. The  
2 connecting portion (52) is formed at one end, and the hexahedron sleeve (56)  
3 is formed at the other end of the body (50a, 50b). Each connecting portion  
4 (52) is half of the body (50a, 50b) in thickness and has a through hole (522)  
5 defined in the connecting portion (52) and a convex distal edge (524) (524 is  
6 not shown in the drawings). Each body (50a, 50b) has a concave face (54)  
7 (54 is not shown in the drawings) formed concentric with the through hole  
8 (522) in the connecting portion (52) at a joint with the connecting portion (52)  
9 to mate with the concave distal edge on an adjacent assembly construction  
10 piece. The hexahedron sleeve (56) has a top (not numbered), a bottom (not  
11 numbered), a front (not numbered), a rear (not numbered) and two sides (not  
12 numbered), a rod hole (562) and an optional bolt hole (564) (in the drawing,  
13 564 is not a bolt hole but a through hole) and is connected to the body (50a,  
14 50b) at one sidebolt hole. The rod hole (562) is rectangular and is defined  
15 through the hexahedron sleeve (56) from the front to the rear so that a rod  
16 (not shown) can be held through the rod hole (562). Additionally, the bolt  
17 hole (564) is defined through the hexahedron sleeve (56) from the top to the  
18 bottom to communicate with the rod hole (562) and aligns with a securing  
19 hole (not shown) in the rod. Thereby, the sleeve piece can be positioned on  
20 the rod by inserting a long screw (not shown) through the bolt hole (564) and  
21 the rod hole (562).

22 With reference to Fig. 6, a sixth embodiment of the do-it-yourself  
23 assembly construction piece is a 90° linear connector that has a twisted body  
24 (60) and two connecting portions (62). The twisted body (60) has two ends

1 (not numbered) and a middle portion twisted to 90° to orient the through  
2 holes (not numbered) in the two connecting portions (62) at right angles to  
3 each other.

4 With reference to Figs 7A and 7B, a seventh group of the do-it-  
5 yourself assembly construction pieces has multiple single plane multiple  
6 point connecting pieces. Each single plane multiple point connecting piece  
7 has a rectangular body (70a, 70b) with four ends and at least three  
8 connecting portions (72) formed on the rectangular body (70a, 70b). One of  
9 the single plane multiple point connecting pieces has three connecting  
10 portions (72) formed respectively at three ends of the body (70a). Another  
11 one of the single plane multiple point connecting pieces has four connecting  
12 portions (72) formed respectively at four ends of the body (70b).

13 With reference to Fig 8, an eighth embodiment of the do-it-yourself  
14 assembly construction piece is an adjustable connecting piece and has a  
15 straight body (80), one connecting portion (82) and an elongated hole (88).  
16 The straight body (80) has two ends. The connecting portion (82) is formed  
17 at one end of the body (80), and the elongated hole (88) is defined through  
18 the body (80) near the other end, is countersunk and has a bore diameter (not  
19 numbered). The bore diameter of the elongated hole (88) is the same as the  
20 through hole (822) in the connecting portion (82). A fastener slidably passes  
21 through the elongated hole (88) to connect the adjustable connecting piece to  
22 an adjacent connecting piece.

23 With reference to Fig 9, a ninth embodiment of the do-it-yourself  
24 assembly construction piece is a pivoting connecting piece that has two

1 bodies (90) and two connecting portions (92). Each body (90) has two ends  
2 (not numbered). Two of the ends are connected pivotally to each other. A  
3 connecting portion (92) is formed at the other end of each body (90).

4 With reference to Figs 10A and 10B, a tenth group of the do-it-  
5 yourself assembly construction pieces has multiple orthogonal corner pieces.  
6 Each orthogonal corner piece has an L-shaped body (100a, 100b) and at least  
7 three connecting portions (102). The L-shaped body (100a, 100b) has  
8 multiple ends (not numbered), and the connecting portions (102) are formed  
9 respectively on the ends of the L-shaped body (100a, 100b). One of the  
10 orthogonal corner pieces has three connecting portions (102) formed  
11 respectively on ends of the body (100a) such that adjacent connecting  
12 portions (102) for three perpendicular planes. Another one of the orthogonal  
13 connecting pieces has four connecting portions (102) are formed respectively  
14 on and extending respectively from ends of the body (100b).

15 With reference to Figs. 11A and 11B, an eleventh group of the do-it-  
16 yourself assembly construction pieces has multiple acute three-axis corner  
17 pieces with flat abutting faces. The acute three-axis corner pieces are similar  
18 respectively to the orthogonal corner pieces having an L-shaped body (110a,  
19 110b) and multiple connecting portions (112) but further have a flat abutting  
20 face (114) formed at an included angle on the L-shaped body. One of the  
21 three-axis corner pieces has three connecting portions (112) formed  
22 respectively on and extending from corresponding ends of the body (110a).  
23 Another one of the three-axis corner pieces has four connecting portions (112)  
24 formed respectively on and extending from ends of the body (110b).

1        With reference to Fig. 12, a twelfth embodiment of the do-it-yourself  
2 assembly construction piece is an offset linear piece that has a long body  
3 (120) and two connecting portions (not numbered). The long body (120) has  
4 two ends (not numbered) that are bent in different directions and are parallel  
5 to each other.

6        With reference to Fig. 13, a thirteenth embodiment of the do-it-  
7 yourself assembly construction piece is a flat curved corner piece that has a  
8 curved body (not numbered) and two connecting portions (not numbered).  
9 The curved body is curved transversely and subtends an arc of 60°, 90°, 120°  
10 or any number of degrees evenly divisible into 360°.

11      When the assembly construction pieces are assembled, two  
12 connecting portions of adjacent assembly construction pieces overlap to align  
13 the through holes. Then, a fastener is passed through and secured in the  
14 through holes. Preferably, the fastener is composed of a flat-head rod and a  
15 sleeve nut. The concave face on the body of one assembly construction piece  
16 mates with the convex distal edge of an adjacent assembly construction piece  
17 to make the adjacent assembly construction pieces adjustable in angle and in  
18 position. Therefore, the assembled objects have more variety.

19      With reference to Figs. 14 to 17, numerous objects can be  
20 constructed using multiple assembly construction pieces. Examples of  
21 objects constructed from the assembly construction pieces include a chair, a  
22 stool, a shelf frame and a bike-rack.

23      With reference to Fig. 18, any of the assembly construction pieces  
24 can be implemented with an anti-rotation device (180) comprising a toothed

1 through hole (184), a flat-head bolt (187) and a sleeve nut (186). The toothed  
2 through hole (184) is formed by forming teeth on an inner surface of the  
3 through hole in the connecting portion (182). The sleeve nut (186) has a  
4 toothed outer surface (188) corresponding to and engaging the toothed  
5 through holes (184) on adjacent assembly construction pieces. The flat-head  
6 bolt (187) screws into the sleeve nut (186) to hold the sleeve nut (186) in the  
7 toothed through holes (184) and keep the adjacent assembly construction  
8 pieces from rotating.

9       The do-it-yourself assembly construction pieces as described can be  
10 used to make various objects limited only by a user's imagination.  
11 Furthermore, the assembly construction pieces can be detached and reused  
12 again to construct other objects.

13       Although the invention has been explained in relation to its preferred  
14 embodiment, many other possible modifications and variations can be made  
15 without departing from the spirit and scope of the invention as hereinafter  
16 claimed.